REMARKS

Claims 14, 18, 21 and 28-33 are pending, with claims 14, 18, and 21 being independent. Without prejudice to or disclaimer of the subject matter contained therein, claims 34 and 35 have been canceled in order to expedite prosecution. Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the following remarks.

Specification

The amendment filed July 30, 2003 is objected to under 35 U.S.C. § 132 because it allegedly introduces new matter into the disclosure. Without conceding the propriety of the objection, claims 34 and 35 have been canceled, thereby obviating the objection.

Claim Rejection under 35 U.S.C. § 112

Claims 34 and 35 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement. Without conceding the propriety of the rejection, claims 34 and 35 have been canceled, thereby obviating the rejection. Accordingly, withdrawal of the rejection under 35 U.S.C. § 112 is respectfully requested.

Claim Rejections under 35 U.S.C. § 103

Claims 14, 28, 29, 34, and 35 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,384,009 ("Mak et al."). Claim 18 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Mak et al. in view of U.S. Patent No. 4,208,241 ("Harshbarger et al."). Claims 21 and 30-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Mak et al. Applicants respectfully traverse these rejections.

Claim 14 recites an oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising CHF_3, argon and HCl or BCl_3, the gas

formulation being free of SF_6. Claim 18 recites an oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising CHF_3, argon and chlorine, the gas formulation being free of SF_6, and a ratio of flow rates of CHF_3:argon:chlorine in the formulation is 5 to 80 sccm:5 to 80 sccm:5 to 60 sccm. Claim 21 recites an oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising (i) more than one fluorine-containing compound, (ii) an inert carrier gas selected from the group consisting of krypton, argon, neon, helium, and mixtures thereof, and (iii) chlorine, the gas formulation being free of SF_6.

It is the Examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to replace Mak et al.'s xenon with argon since both gases are seen as equivalent in that they belong to the same chemical family and possess the same chemical properties; hence, substitution of one for the other would have been obvious for the purpose of providing an inert carrier gas.

Mak et al. discloses a process for selectively etching a substrate having grain boundaries and a resist material thereon. Mak et al. discloses a process gas that comprises xenon. Mak et al. discloses that in plasma etch processes, it is desirable for the process gases to have a low ionization potential so that less energy is required to ionize the gases. (Column 1, Lines 60-62). Mak et al. discloses that the process gases have low ionization potential (Column 2, Lines 9-17). Mak et al. further discloses that the addition of xenon to the process gas provides an etch gas with a higher etching selectivity ratio than an etch gas without xenon. (Column 4, Lines 25-27).

PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS

As explained in MPEP § 2141.02, a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

Mak et al. discloses that the process gases have low ionization potential so that less energy is required to ionize the gases. Xenon has an ionization energy of 12.1 ev, compared to ionization energies of 14.0 ev, 15.8 ev, 21.6 ev, and 24.6 ev for krypton, argon, neon, and helium, respectively. Mak et al. does not suggest that replacing xenon with a noble gas having an ionization potential higher than that of xenon might provide the same advantages as the disclosed process gas comprising xenon. Applicants respectfully submit that Mak et al. teaches away from the combinations of features recited in claims 14, 18, and 21, which recite plasma etching gas formulations including argon (claims 14 and 18) or argon, krypton, neon, and/or helium (claim 21), inert gases with higher ionization potentials than xenon.

THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE

As explained in MPEP § 2143.01, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Mak et al. discloses a process gas having xenon to provide low ionization potential so that less energy is required to ionize the gases and high selectivity can be achieved. Xenon has an ionization energy of 12.1 ev, compared to ionization energies of 14.0 ev, 15.8 ev, 21.6 ev, and 24.6 ev for krypton, argon, neon, and helium, respectively. Replacing the xenon of Mak et al. with a noble gas having an ionization potential higher than that of xenon would not provide the same advantages as the xenon-containing process gas. Applicants respectfully submit that the proposed modification of Mak et al. changes its principle of operation, by providing plasma etching gas formulations with higher ionization potentials, which would require more energy and achieve less selectivity than desired by Mak et al.

Summary

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143.

It is the Examiner's position that substitution of argon for xenon would have been obvious for the purpose of providing an inert carrier gas. Mak et al. discloses that the process gases have low ionization potential so that less energy is required to ionize the gases. Mak et al. further discloses that the addition of xenon to the process gas provides an etch gas with a higher etching selectivity ratio than an etch gas without xenon. It is respectfully submitted that a person of ordinary skill in the art would not have been motivated to replace the xenon, having an ionization energy of 12.1 ev (and an atomic weight of 131.30 g) in Mak et al.'s process gas with argon, having an ionization energy of 15.8 ev (and an atomic weight of 39.948 g). Based on the disclosure of Mak et al., it is clear that xenon and argon are not equivalent since they do not possess the same chemical properties and do not achieve the same results in Mak et al.'s process.

It is respectfully submitted that Mak et al., or Mak et al. in view of Harshbarger et al., does not disclose or suggest the presently claimed oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer. Specifically, Mak et al., or Mak et al. in view of Harshbarger et al., does not disclose or suggest an oxygen-free plasma etching gas formulation for removing an organic ARC on a metallic layer comprising argon or an inert carrier gas selected from the group consisting of krypton, argon, neon, helium, and mixtures thereof. Accordingly, withdrawal of the rejections under 35 U.S.C. § 103(a) is respectfully requested.

Conclusion

For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the presently claimed invention as defined by the claims.

In view of the foregoing remarks, reconsideration of the claims and allowance of the subject application is earnestly solicited. The Examiner is invited to contact the undersigned at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

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By: _____
Asaf Batelman
Registration No. 52,600

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620